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Technology Center 2100

At page 31, line 31:

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The above-described implementation according to one embodiment of the present invention is illustrated in Fig. 16, which conceptually illustrates a host computer. The host computer includes an application layer 121 (see also Fig. 13) and a multi-path mapping layer 125 that can select between any of four paths P1-P4. The host computer includes a normal read/write path 1501 that handles normal read and write operations. In addition, out of band commands do not pass through the normal read/write path, as conceptually shown at 1503. As discussed above, in one embodiment of the present invention, the multi-path mapping layer 125 may recognize out of band commands as not being restricted to a particular path.

REMARKS

In response to the Office Action mailed February 3, 2003, Applicants respectfully request reconsideration. To further the prosecution of the present application, each of the rejections set forth in the Office Action is addressed below. The application is believed to be in condition for allowance.

Overview

Initially, Applicants note that a number of the rejections set forth in the Office Action appear to be based on a concern that the specification does not explain in detail how an out of band command works. As discussed in more detail below, these rejections are improper, as out of band commands are clearly known to those of skill in the art. While one aspect of Applicants' invention relates to techniques for dealing with out of band commands, Applicants have not invented ways of implementing out of band commands. Therefore, the level of detail that the Examiner seeks in explaining the manner in which out of band commands works is not needed, or even desirable, in the present application.

The Office Action fails to interpret the term "out of band command" as those of skill in the art would and as the term is defined in the specification. As a result, the Office Action interprets the claims in an unreasonably broad manner to read upon prior art references that do not even discuss systems that employs out of band commands, let alone disclose the techniques for dealing with them recited in Applicants' claims.

New Drawings Are Enclosed

In paragraphs 7-8 of the Office Action, the drawings are objected to as being of poor quality. The Office Action also seeks to have Fig. 1 labeled as Prior Art. New drawings are enclosed to address these concerns.

The Rejection Under §112, ¶1 Is Improper - The Specification Is Fully Enabling

At ¶10 of the Office Action, claims 1-22 are rejected under 35 U.S.C. §112, ¶1 as containing subject matter allegedly not described in the specification in an enabling manner. The rejection is supported by a number of comments included in the "Response to Arguments" section of the Office Action as well. This rejection is respectfully traversed.

The Office Action indicates that the Examiner has attempted to learn what is meant by out of band commands by reading the relevant portions of the specification, but asserts that neither the specification nor the drawings illustrate the normal read/write path or describe how out of band commands work. The Examiner's diligence in reviewing the specification is appreciated. To address the concerns expressed in the Office Action, Applicants have added Fig. 16, which illustrates that in a host computer that supports out of band commands, there is a normal read/write path and a different logical path through which the out of band commands are processed. No subject matter is added via this amendment, as Fig. 16 merely shows pictorially what is explained in the text of the specification.

Applicants' prior response explained that out of band control commands are path-specific operations that identify a particular path over which they will be executed, and are associated with control functions or the reading and writing of data outside of the normal read/write path. The Office Action asserts that these explanations are unclear, and seeks further clarification. In this respect, it should be appreciated that Applicants' invention has nothing whatsoever to do with creating a system to implement out of band commands, which are well known in the art. As discussed in the specification, one specific use for aspects of the present invention is in connection with the **get** and **put** commands that are implemented in UNIX using IOCTL commands (see specification pages 27-28). UNIX IOCTL commands are understood by those of skill in the art to be out of band commands that do not pass through the normal read/write path.

(see specification pages 27-28). Applicants' invention has nothing whatsoever to do with the UNIX operating system or how it functions.

Out of band commands such as the set of IOCTL commands in UNIX (and similar commands in other operating systems) are well known to those of skill in the art, such that no explanation concerning the manner in which they operate is required in the present application. Applicants' explanation of these commands as passing through a separate read/write path should suffice, and is entirely consistent with the manner in which out of band commands are understood by those of skill in the art. For example, attached are two print outs of web pages the undersigned located by performing a search of the Internet for a discussion of UNIX IOCTL commands and out of band data. In a first (with the heading "Out-of-band data"), the third sentence states that "Out-of-band data is delivered to the user independently of normal data." Similarly, at the top of the second page of the print out entitled "Communications Programming Concepts", it is stated:

Out-of-band (OBOE) data is a *logically independent transmission channel* associated with each pair of connected stream sockets. *Out-of-band data can be delivered to the socket independently of the normal receive queue* or within the receive queue depending upon the status of the **SO_OOBINLINE** socket-level option. (italics added)

As should be appreciated from the foregoing, out of band commands are well understood by those skilled in the art to not pass through the normal read/write channel - they can pass through a "logically independent transmission channel" so that the associated data is received "independently" of the data through the normal read/write path. Thus, the attachments support the characterization of out of band commands provided in Applicants' specification, and demonstrate that out of band commands are known to those of skill in the art.

In ¶3, the Examiner asserts that there are four possible interpretations for the explanation of an out of band command being outside of the normal read/write path, so that the specification is confusing. Applicants respectfully assert that the specification must be interpreted in the manner in which it would be understood by those of skill in the art, and that one of skill in the art would not be confused by the specification, and would understand the manner in which an out of band command operates. For the sake of assisting the Examiner in his understanding, and for

clarity of the record, Applicants respectfully point out that none of the four possible interpretations recited in the Office Action is actually correct. As shown in the newly added revised Fig. 16, the bypassing of the normal read/write path by an out of band command does not relate to the selection of one of the multiple physical paths P1-P4 that may exist in a multi-path system. In fact, as discussed in Applicants' specification, out of band commands can be employed in a single path system. The reference to bypassing the normal read/write path relates to "logically independent transmission channels" through layers within the host computer, as opposed to being restricted to passing over different physical paths between the host computer and a storage system.

As discussed in Applicants' specification beginning at page 23 (referring to Fig. 14), there are different labels that may be attached to a particular logical volume (e.g., LV1) that an application may seek to access. An application that is not path-specific may simply seek to identify the logical volume LV1 using a generic identifier such as that illustrated at 59 in Fig. 14, which then enables the multi-path layer 125 (Fig. 13) to select any of the paths P1-P4 to transmit the command down to the logical volume LV1 in the storage system 103. Conversely, an operation that is path-specific (such as an out of band command) does not identify a logical volume such as LV1 generically, but rather uses a more specific identifier that not only identifies the volume to be accessed, but also the path to be used for the access. An example of such an identifier is illustrated conceptually at 55 in Fig. 14, which specifies accessing logical volume LV1 over the path P3. This is described at page 27, lines 10-15 of the specification, which explains that path-specific operations will use the labels 53-56 that identify the volumes and the paths over which they are to be accessed.

In ¶4, the Office Action asserts that the interpretation adopted was that an out of band command is sent over one of the paths P1-P4 and the normal read/write path is over a different one of the paths P1-P4. It is respectfully asserted that this interpretation is not proper, and directly contradicted by the specification. For example, at page 31, lines 15-23, an explanation of one embodiment of the present invention is provided that enables multi-pathing of an out of band command (e.g., an IOCTL command). That is, the multi-patching mapping layer 125 may select any of the paths P1-P4 for servicing the out of band (e.g., IOCTL) command, so that it is not restricted to being transmitted over the path that the command identifies. Thus, as is clear

from this section of the specification, the normal read/write path bypassed by an out of band command such as the IOCTL command is simply unrelated to which physical path is used to transmit the command between the host computer and the storage system.

As should be appreciated from the foregoing, the manner in which an out of band command operates is not part of Applicants' invention, and is well known to those of skill in the art, such that no detailed explanation in the specification is necessary. All that is necessary for an understanding of the present invention is that out of band commands are special types of commands (known by those skilled in the art) that are path-specific, and that aspects of Applicants' invention relate to employing out of band control commands in a multi-path system and not restricting them to the particular path specified. Thus, in view of the fact that the manner in which an out of band control command operates is not part of Applicants' invention, and in view of the fact that the term has a meaning known to those of skill in the art (e.g., see the attachments), it is respectfully asserted that the rejection of the claims under 35 U.S.C. §112, ¶1 as lacking an enabling disclosure is improper, and should be withdrawn.

The Claims Distinguish Over the Prior Art of Record

Kikinis

Initially, Applicants respectfully point out that there is some ambiguity in the Office Action. In the prior Action, the independent claims were rejected under §102 as being anticipated by Kikinis. In the present Action, it is stated that Applicants' arguments are moot in view of new grounds of rejection, and Kikinis is purportedly only relied upon under a §103 rejection in combination with Grun at ¶21. However, ¶22 asserts that "Kikinis anticipates all the limitations of claims 1 and 2." Therefore, it is respectfully asserted that it is unclear whether Kikinis is still relied upon as an allegedly anticipatory reference for any of Applicants' pending claims.

To the extent that Kikinis is relied upon as purportedly anticipating any of the claims, Applicants respectfully traverse such a rejection for the reasons stated in the prior response, which is incorporated herein by reference. As stated therein, Kikinis is completely silent with respect to teaching anything about the processing of an out of band control command (when that term is properly interpreted in view of Applicants' specification), let alone selecting a path for

transmitting such a command using a selection criteria that enables the selected path to be other than the target path identified in the command.

Grun-Alone or In Combination with Kikinis

All of the claims are rejected either under §102 as being anticipated by Grun, or under §103 as being obvious over Grun in view of Kikinis. These rejections are respectfully traversed. Initially, Applicants note that as with Kikinis, Grun is completely silent about the processing of an out of band control command when that term is properly interpreted in view of Applicants' specification, and the Office Action does not point to any section of Grun that purportedly teaches the processing of an out of band control command. It is respectfully asserted that the Office Action fails to give proper meaning to this term recited in the claims, rendering the rejection improper.

At ¶5, the Examiner asserts that since the claims do not state that an out of band command chooses a data path for transfer, the Examiner can assert that an out of band command is any form of command. To the extent Applicants understand what is meant, it is objectionable on multiple grounds. First, claim 1, as an example, does recite that the out of band control command identifies a target address *and a target path* for transmission of the command, and also recites a step of selecting a path based upon selection criteria that enables the selected path to be other than the target path identified by the out of band control command. Thus, it is not understood what is meant when the Examiner asserts that the claims do not require that an out of band command choose a particular path, as the claim specifically recites that the out of band control command specify a target path.

Second, Applicants' specification specifically defines an out of band control command as one that is outside of the normal read/write path of the system. As stated in the prior response, while the Examiner is entitled to give claims their broadest reasonable interpretation, they must be interpreted in light of the specification, and cannot be interpreted in a manner that is inconsistent with the definition provided therein, as Applicants are entitled to their own lexicographer. (MPEP §2111 and 2111.01). Thus, to the extent the Examiner is asserting that he can disregard the interpretation of the phrase out of band control command recited in the

specification solely because the definition is not explicitly provided in the claims, this is improper.

In ¶6, the Examiner again asserts that in Kikinis, requests for data can be sent over one type of communication medium and the data can be received over another, which purportedly renders Applicants' arguments unpersuasive. The Examiner's point in this respect is lost on Applicants, as there is no disagreement about the manner in which Kikinis operates. However, the fact that Kikinis teaches a system wherein a request for data can be transmitted over one line and the data received over another is entirely irrelevant with respect to an out of band control command, as it teaches nothing whatsoever concerning a command that does not pass through the normal read/write path of the system.

As should be appreciated from the foregoing, the rejection of the claims over the prior art is improper, as it fails to give the meaning to the phrase out of band control command that is provided in the specification and is understood by those of skill in the art. Therefore, the rejection of the claims under §102 and/or §103 should be withdrawn.

Conclusion

In view of the foregoing amendments and remarks, this application should be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicants' attorney at the telephone number listed below to discuss any outstanding issues relating to the allowability of the application.

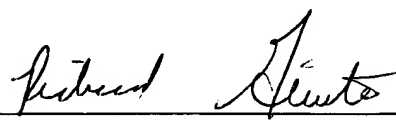
If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

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Date: 03/11/03

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MARKED-UP SPECIFICATION

At page 7, lines 5-6:

Fig. 14 is a conceptual illustration of the manner in which logical volumes are managed in a multi-path computing system; [and]

At page 7, lines 7-9:

Fig. 15 is a flow chart of the steps performed during execution of a file transfer utility employing the multi-path capability in accordance with one embodiment of the present invention[.] ; and

At page 7, line 10, please add the following paragraph:

Fig. 16 is a conceptual illustration of out of band commands that do not pass through the normal read/write path in a host computer.

Please insert the following paragraph beginning at page 31, line 31:

The above-described implementation according to one embodiment of the present invention is illustrated in Fig. 16, which conceptually illustrates a host computer. The host computer includes an application layer 121 (see also Fig. 13) and a multi-path mapping layer 125 that can select between any of four paths P1-P4. The host computer includes a normal read/write path 1501 that handles normal read and write operations. In addition, out of band commands do not pass through the normal read/write path, as conceptually shown at 1503. As discussed above, in one embodiment of the present invention, the multi-path mapping layer 125 may recognize out of band commands as not being restricted to a particular path.